

# Geochronology Database for Central Colorado

Data Series 489

# **Geochronology Database for Central Colorado**

By T.L. Klein, K.V. Evans, and E.H. DeWitt

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**U.S. Department of the Interior**  
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# Geochronology Database for Central Colorado

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## Abstract

This database is a compilation of published and some unpublished isotopic and fission track age determinations in central Colorado. The compiled area extends from the southern Wyoming border to the northern New Mexico border and from approximately the longitude of Denver on the east to Gunnison on the west. Data for the tephrochronology of Pleistocene volcanic ash, carbon-14, Pb-alpha, common-lead, and U-Pb determinations on uranium ore minerals have been excluded.

## Introduction

This database is a compilation of published and some unpublished isotopic and fission track age determinations in central Colorado. The compiled area extends from the southern Wyoming border to the northern New Mexico border and from approximately the longitude of Denver on the east to Gunnison on the west (fig. 1). This compilation was concentrated in the area of the Central Colorado Assessment Project and will be used to develop a geologic framework for the area as part of the compilation of a 1:100,000-scale geologic map for the study area. Data from outside the study area also were included to provide information on regional age relationships, and their compilation is, therefore, not as exhaustive. Data for the tephrochronology of Pleistocene volcanic ash, carbon-14, Pb-alpha, common-lead, and U-Pb determinations on uranium ore minerals have been excluded.

This database includes data from Wilson and Bryant (2006) for the Fort Collins, Estes Park, Denver West, and Bailey 1:100,000-scale quadrangles in the northern and central Front Range. These data were supplemented with recent age determinations, and some of the locations were updated.

The ages in this database that were determined using older decay constants have been corrected using the decay constants recommended by the International Union of Geological Sciences Subcommittee on Geochronology (Steiger and Jaeger, 1977). K/Ar ages that were calculated with the older decay constant ( $^{40}\text{K}/\text{K}=1.19\times 10^{-4}$  mol/mol) and abundance constants were converted to the modern decay constant ( $^{40}\text{K}/\text{K}=1.16\times 10^{-4}$  mol/mol) using the tables in Dalrymple

(1979). Older Rb-Sr ages that used the decay constant ( $^{87}\text{Rb}\lambda=1.39\times 10^{-11}/\text{yr}$ ) were recalculated using the currently accepted constant ( $^{87}\text{Rb}\lambda=1.42\times 10^{-11}/\text{yr}$ ). The original published ages (*Age\_Report*) are given in table 1 as well as the recalculated ages (*Age\_Ma*).

More than 2,000 age determinations are contained in the database. The distribution of data points is shown in figure 1. The data are presented as a Microsoft Excel spreadsheet and an ESRI shapefile. The data are the same in each of the formats. The geographic coordinates are unprojected and use the North American Datum of 1927 (*NAD 27*).

In the original publications many sampling sites were not precisely located on geologic maps or by geographic coordinates. Locations for these samples were derived from written descriptions and sketch maps. Location points were digitized within the appropriate geologic unit by using the largest-scale published geologic base map available in the area of the sampling site. These sampling sites also were modified to place them along likely access routes (roads or trails) and in areas of likely outcrops within the appropriate geologic unit. Samples with approximate locations are so indicated in the comments field (*Comments*).

The boundary of the Central Colorado Assessment Project is included in this report as an ESRI polygon shapefile. Compilation of the data for this report is most complete within the study area. Use of this boundary file will allow the user to accurately determine the area where the data are most completely compiled.

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## **Geochronology database field names for spreadsheet**

*FID* – Program generated unique ID.

*Unit\_name* – Lithology of sample.

*Rock\_Unit* – Formal or informal rock unit name or geographic area.

*Sample\_No* – Published field or laboratory number where available.

*Quad\_1\_degree* – USGS 1/2°x1° topographic quadrangle name.

*Quad\_24k* – USGS 7.5-minute topographic quadrangle name.

*Method* – Geochronology method.

*Mineral* – Type of material analyzed.

*Age\_Ma* – Geochronologic age, in millions of years (Ma).

*Age\_Uncert* – Analytical precision.

*Age\_Report* – Age as reported before recalculation using modern constants, in millions of years with analytical precision when given in reference.

*Reference* – Short form of determination reference, complete reference in “Geochronology References” section.

*Comments* – Comments on the age determination.

*X* – Longitude in decimal degrees (NAD27).

*Y* – Latitude in decimal degrees (NAD27).

## **Abbreviations**

FT – fission track

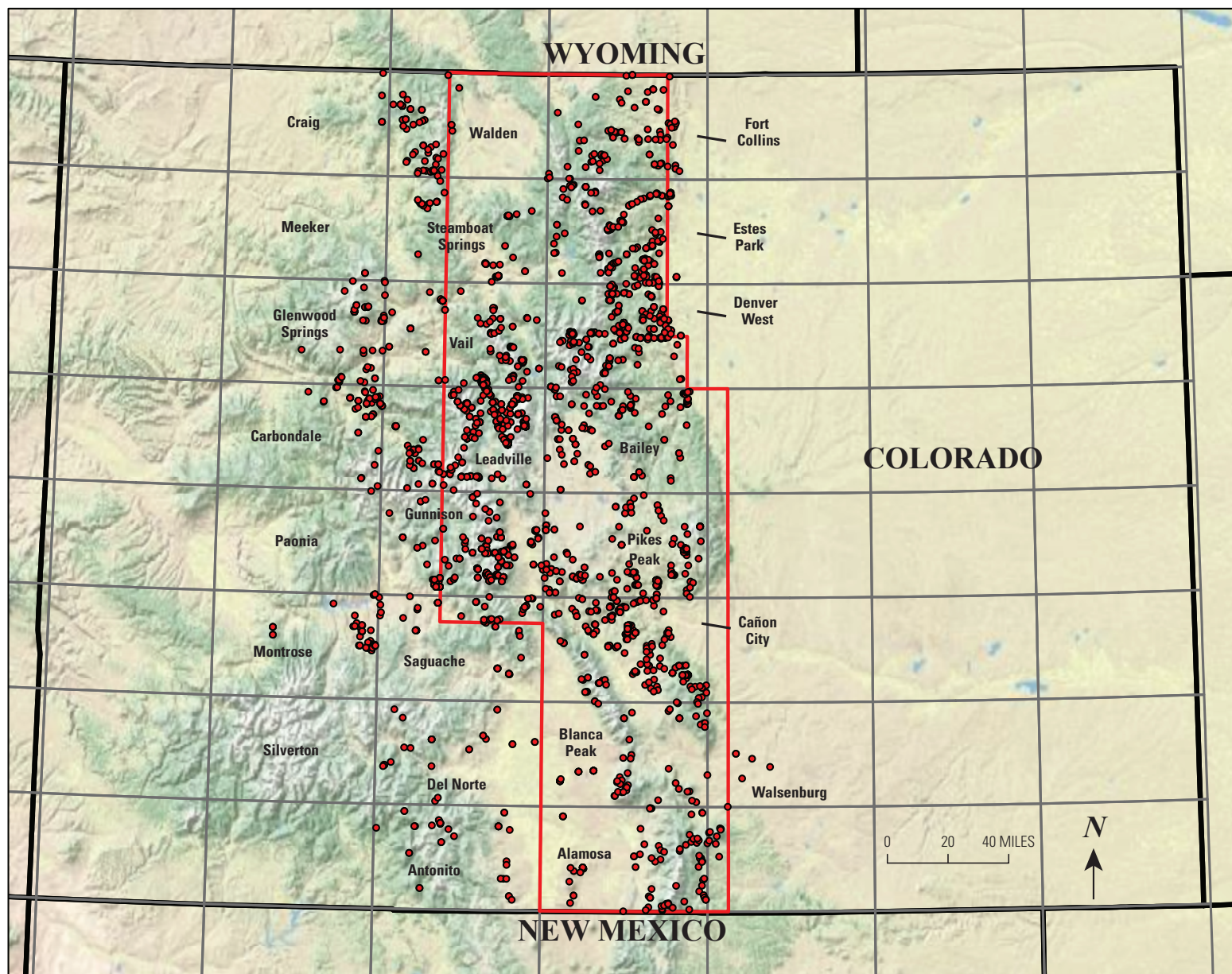
K/Ar – potassium/argon

Nd-Sm – neodymium-samarium

Rb-Sr – rubidium-strontium

U-Pb – uranium-lead

<sup>40</sup>Ar/<sup>39</sup>Ar – <sup>40</sup>argon/<sup>39</sup>argon



**Figure 1.** Sampling sites for published geochronology are represented by red filled circles. The location of Central Colorado Assessment Project area is represented by the red outline, 1/2°x1° topographic quadrangles are outlined in fine gray lines, and State boundaries are shown as coarse solid black lines. Names of the topographic quadrangles within and adjacent to the project area are shown.

**Table 1 - Geochronology Database for Central Colorado**

See accompanying Microsoft Excel spreadsheet or ESRI shapefile.

**[Link to spreadsheet](#)**



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